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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,265	08/10/2001	Thomas M. Barbara	01-04 US	5283

23693 7590 02/03/2003

Varian Inc.  
Legal Department  
3120 Hansen Way D-102  
Palo Alto, CA 94304

EXAMINER

VARGAS, DIXOMARA

ART UNIT PAPER NUMBER

2862

DATE MAILED: 02/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	09/927,265		BARBARA, THOMAS M.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Dixomara Vargas		2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 November 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3, 7-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mansfield et al. (US 4,978,920).

With respect to claim 1, Mansfield discloses an extended Maxwell pair comprising (Figures 19 and 25): a pair of semi-cylindrical gradient coils disposed coaxially around and along a z-axis extending in z-direction and symmetrically with respect to an origin (Figures 19 and 25), each being of radius  $a$  and of axial length  $d$  (Column 12, lines 18-32; Figures 19 and 25), said pair being mutually separated by a center-to-center distance  $Z_0$  which is greater than  $d$  (Figures 19 and 25); and means for causing equal magnitude currents to flow through said gradient coils in mutually opposite directions (Figures 19 and 25; as shown by arrows); values of  $d$  and  $Z_0$  being selected such that said equal currents generate a magnetic field along said z-axis with a linear gradient near said origin in said z-direction (Column 12, lines 27-29); a pair of shield coils disposed coaxially around said gradient coils, each of said shield coils being of radius  $b$  which is greater than  $a$  (Column 17, lines 30-34; Figure 25, #S1 and #S2), said means causing said equal currents to flow through said shield coils, said shield coils serving to cancel magnetic field outside said shield coils (Column 12, lines 29-32).

Mansfield discloses the claimed invention except for the shield coil pair being completely cylindrical. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mansfield for the purpose of obtaining a stronger field by generating a field with an extended coil covering the region of interest with a complete structure and acquiring an image through an extended field of view depending on the area to be examined.

3. With respect to claim 3, Mansfield discloses said magnetic field along said z-axis, when expanded in a polynomial form in z, does not include a cubic term (Column 12, lines 35-50).

4. With respect to claim 7, Mansfield discloses each of said shield coils comprises a wire which is wound cylindrically at specified intervals, said intervals being determined such that said shield coils have effects of canceling magnetic field external to said shield coils (Column 12, lines 29-32; Figure 25).

5. With respect to claims 8 and 19, Mansfield discloses a and d are of a same order of magnitude (Figures 19 and 25).

6. With respect to claims 9, 13-16, Mansfield discloses the claimed invention except for a, b, d and  $Z_0$  satisfy an equation given by  $\int^{k_{\max}} dk k^4 \{ \sin(kd/2) \sin(kZ_0/2) / (kd/2) \} S_0(k) K_0'(ka) I_0(k\rho) = 0$  where  $S_0(k) = 1 - K_1(kb) I_1(ka) / K_1(ka) I_1(kb)$ , and  $K_1$  are modified Bessel functions,  $k_{\max}$  is an appropriately selected upper limit of integration and  $\rho$  is an appropriately selected value less than

a. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Bessel function variation for the purpose of expressing the current flow of a coil structure.

7. With respect to claims 10 and 17, Mansfield discloses the claimed invention except for said gradient coils and said shield coils are structured such that said equal currents will have

current distribution along said z-axis given by  $j$  and  $j$  respectively for said gradient coils and said shield coils, and an shielding equation given by  $I^S(k) = -(a/b)(I_1(ka)/I_1(kb))I^P(k)$  is satisfied where  $I_1$ , are modified Bessel functions of the first kind,  $I^P(k)$  and  $I^S(k)$  are current density functions  $I^P(z)$  and  $I^S(z)$  respectively for said gradient coils and said shield coils Fourier-transformed into k-space,  $I^P(z) = \int_{-\infty}^{\infty} dz' j^P(\varphi, z')$  and  $I^S(z) = \int_{-\infty}^{\infty} dz' j^S(\varphi, z')$ . It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Bessel function variation for the purpose of expressing the current flow of a coil structure.

8. With respect to claim 11, see rejection of claims 1, 9 and 10 above.

9. With respect to claim 12, Mansfield discloses said shield coil current distribution by discrete conductor disposition on said cylindrical shield coil surfaces (Columns 17-18, lines 25-66 and 1-47 respectively; Figure 25).

10. With respect to claim 18, Mansfield discloses the claimed invention except for said formula for canceling magnetic field out said shield coils is given by

$I^S(k) = -(a/b)(I_1(ka)/I_1(kb))I^P(k)$ . It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mansfield for the purpose of obtaining a stronger field and avoid the gradient field to interfere with another RF field.

11. With respect to claim 20, see rejection of claims 1, 9 and 10 above.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mansfield et al. (US 4,978,920) in view of Vavrek et al. (US 5,185,576).

With respect to claim 5, Mansfield discloses the claimed invention except for said gradient coils comprises a helically rolled rectangular conductor sheet. Vavrek discloses said helically rolled structure (Figures 2 and 3). It would have been obvious to one of ordinary skill

in the art at the time the invention was made to modify Mansfield using Vavrek teachings for the purpose of avoiding interaction between the gradient with any other RF coil and improving the SNR (Column 4, lines 3-17).

### ***Response to Arguments***

13. Applicant's arguments filed November 26, 2002 have been fully considered but they are not persuasive. Applicant argues that the present application is distinguished from the prior art since the present application requires a single shield at one radius and the prior art discloses two or more shields at one radius.

14. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., single shield or single screen) are not recited in the rejected claim(s). The claim clearly recites a pair of shield coils of radius b. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### ***Conclusion***

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

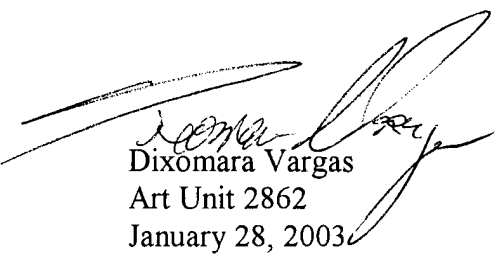
Art Unit: 2862

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

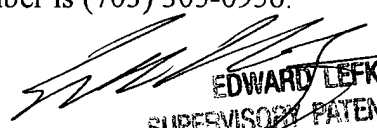
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (703) 305-5705. The examiner can normally be reached on 8:00 am. to 4:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (703) 305-4816. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



Dixomara Vargas  
Art Unit 2862  
January 28, 2003



EDWARD LEFKOWITZ  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800  
Edward Lefkowitz  
Supervisory Patent Examiner  
Technology Center 2800